



Day-ahead Market Enhancements Straw Proposal

James Friedrich & Perry Servedio
Market Design Policy

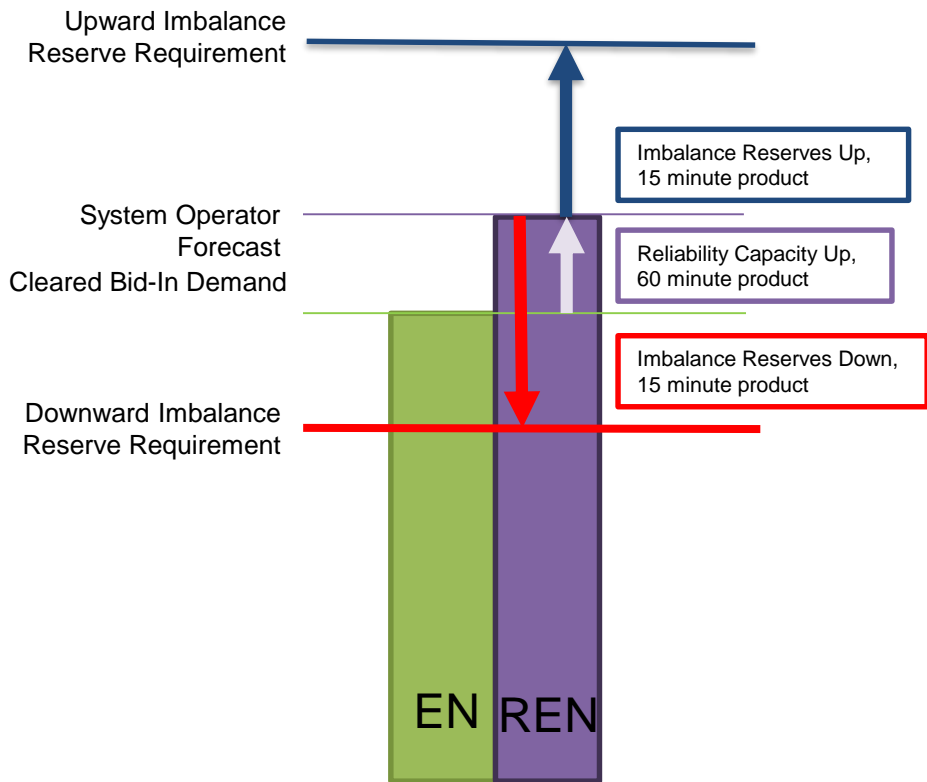
Stakeholder Call
March 5, 2020

Agenda

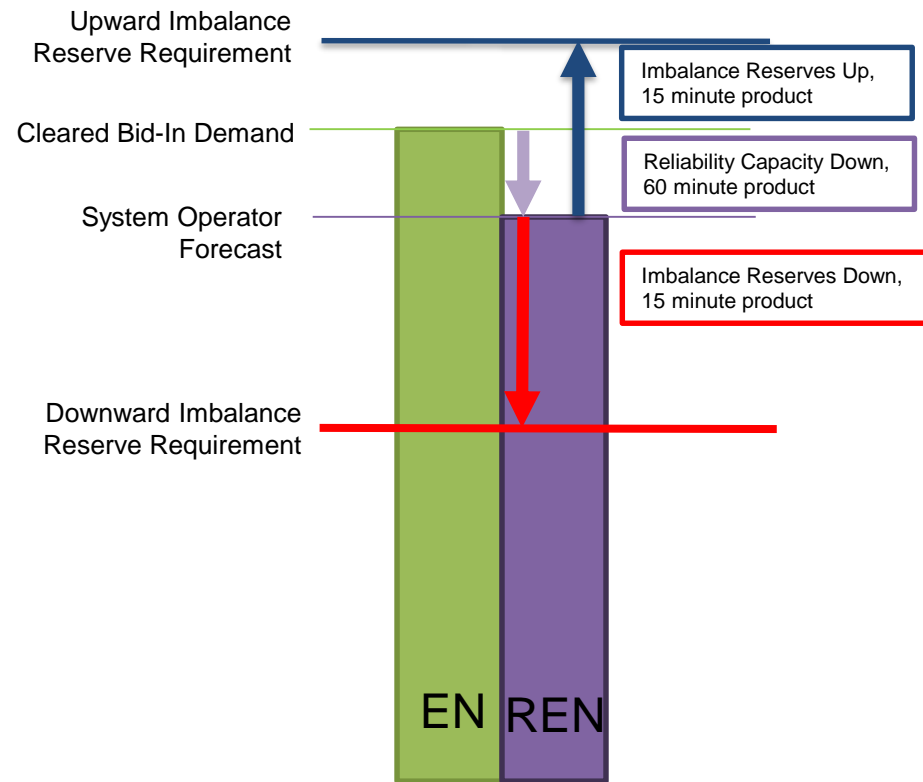
Time	Topic	Presenter
10:00 – 10:05 AM	Welcome and Introductions	Kristina Osborne
10:05 – 11:20 AM	DAME Design Overview & Generator Examples	James Friedrich
11:20 – 11:45 AM	Congestion Revenue Rights	Perry Servedio
11:45 – 11:55 AM	Market Power Mitigation	Perry Servedio
11:55 AM – 12:00 PM	Next Steps	Kristina Osborne

Co-optimization of bid-in demand and system forecast will result in the efficient procurement of energy and capacity products

Forecast > Cleared Demand



Forecast < Cleared Demand



The day-ahead market will produce two day-ahead schedules and prices

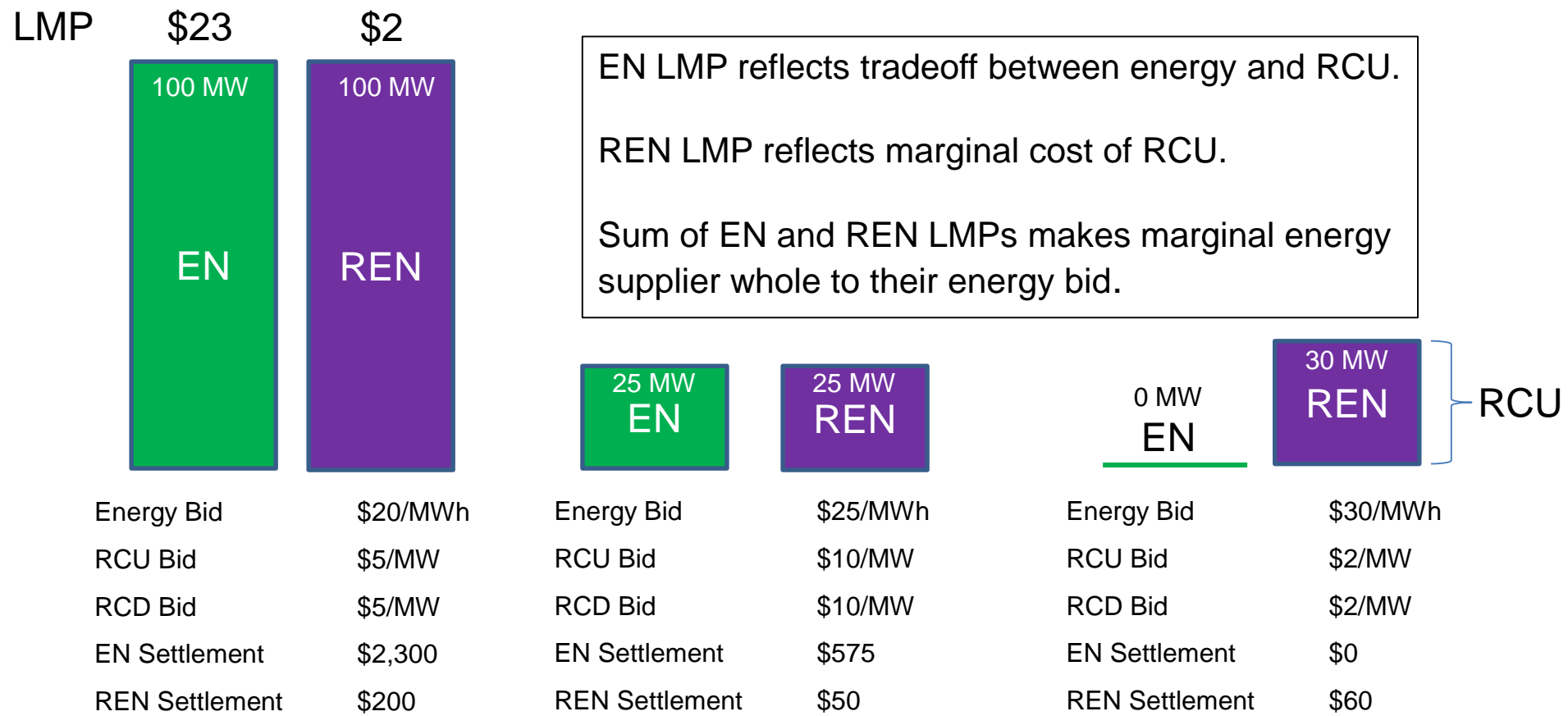
1. Day-ahead energy schedule for physical and virtual resources based on cleared bid-in demand.
 - Results in day-ahead energy LMP and settlement

2. Reliability energy schedule for physical resources based on system operator forecast.
 - Results in a REN LMP with separate settlements for each of its components (EN, RCU and RCD) because of the need for different cost allocations for each component

3-generator examples to help explain LMPs

	Generator 1 (G1)		Generator 2 (G2)		Generator 3 (G3)
PMIN	0 MW	PMIN	0 MW	PMIN	0 MW
PMAX	100 MW	PMAX	100 MW	PMAX	100 MW
Ramp Rate	2 MW/min	Ramp Rate	2 MW/min	Ramp Rate	2 MW/min
Energy Bid	\$20/MWh	Energy Bid	\$25/MWh	Energy Bid	\$30/MWh
RCU Bid	\$5/MW	RCU Bid	\$10/MW	RCU Bid	\$2/MW
RCD Bid	\$5/MW	RCD Bid	\$10/MW	RCD Bid	\$2/MW

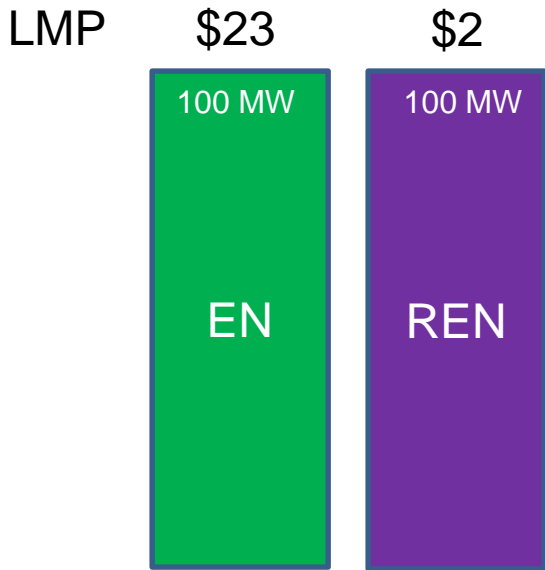
Scenario 1: Load bids 125MW @ \$50, Forecast = 155MW



Load pays \$23/MWh and allocated \$2/MWh for energy schedule

Scenario 1: Load bids 126MW @ \$50, Forecast = 155MW

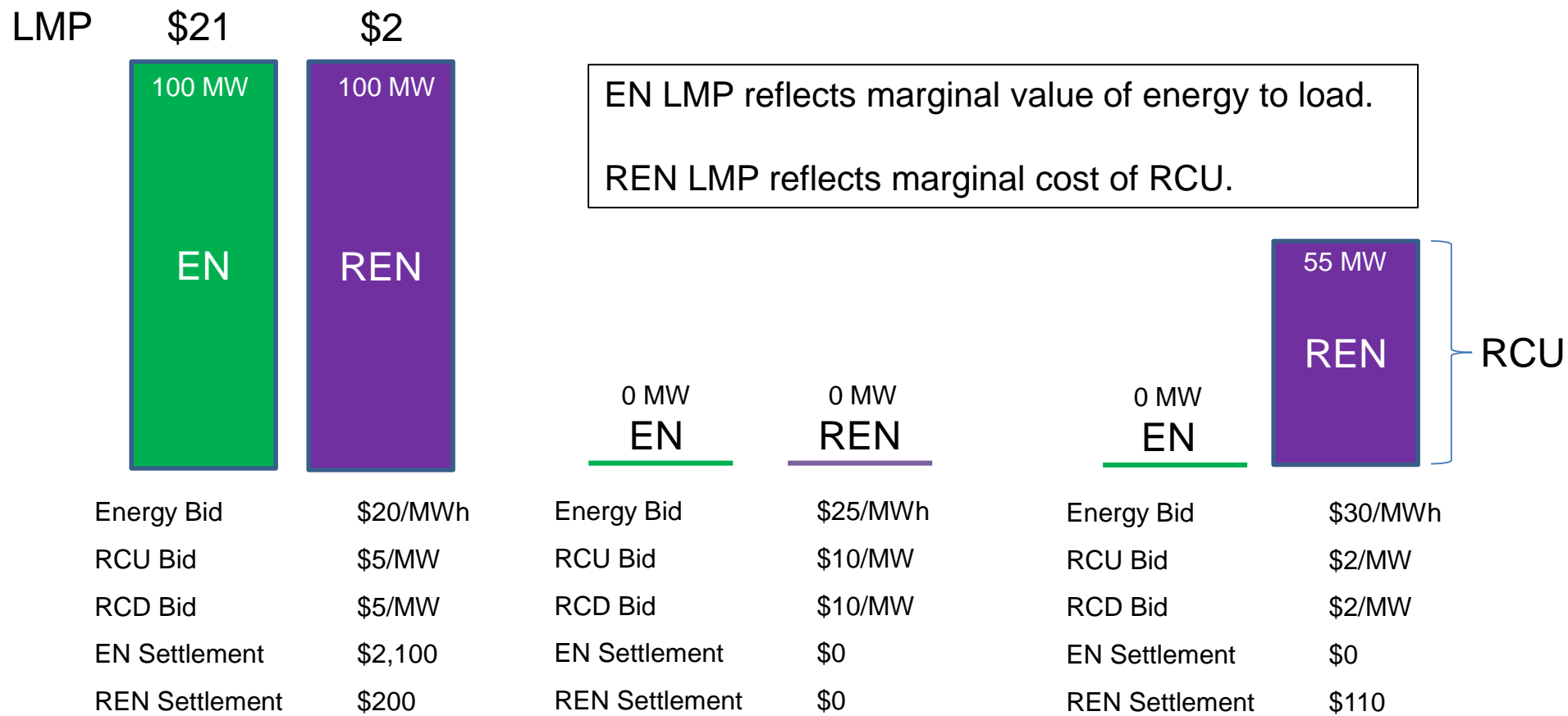
EN LMP reflects tradeoff between energy and RCU.
 REN LMP reflects marginal cost of RCU.
 Sum of EN and REN LMPs makes marginal energy supplier whole to their energy bid.



Energy Bid	\$20/MWh	Energy Bid	\$25/MWh	Energy Bid	\$30/MWh
RCU Bid	\$5/MW	RCU Bid	\$10/MW	RCU Bid	\$2/MW
RCD Bid	\$5/MW	RCD Bid	\$10/MW	RCD Bid	\$2/MW
EN Settlement	\$2,300	EN Settlement	\$575	EN Settlement	\$0
REN Settlement	\$200	REN Settlement	\$50	REN Settlement	\$60

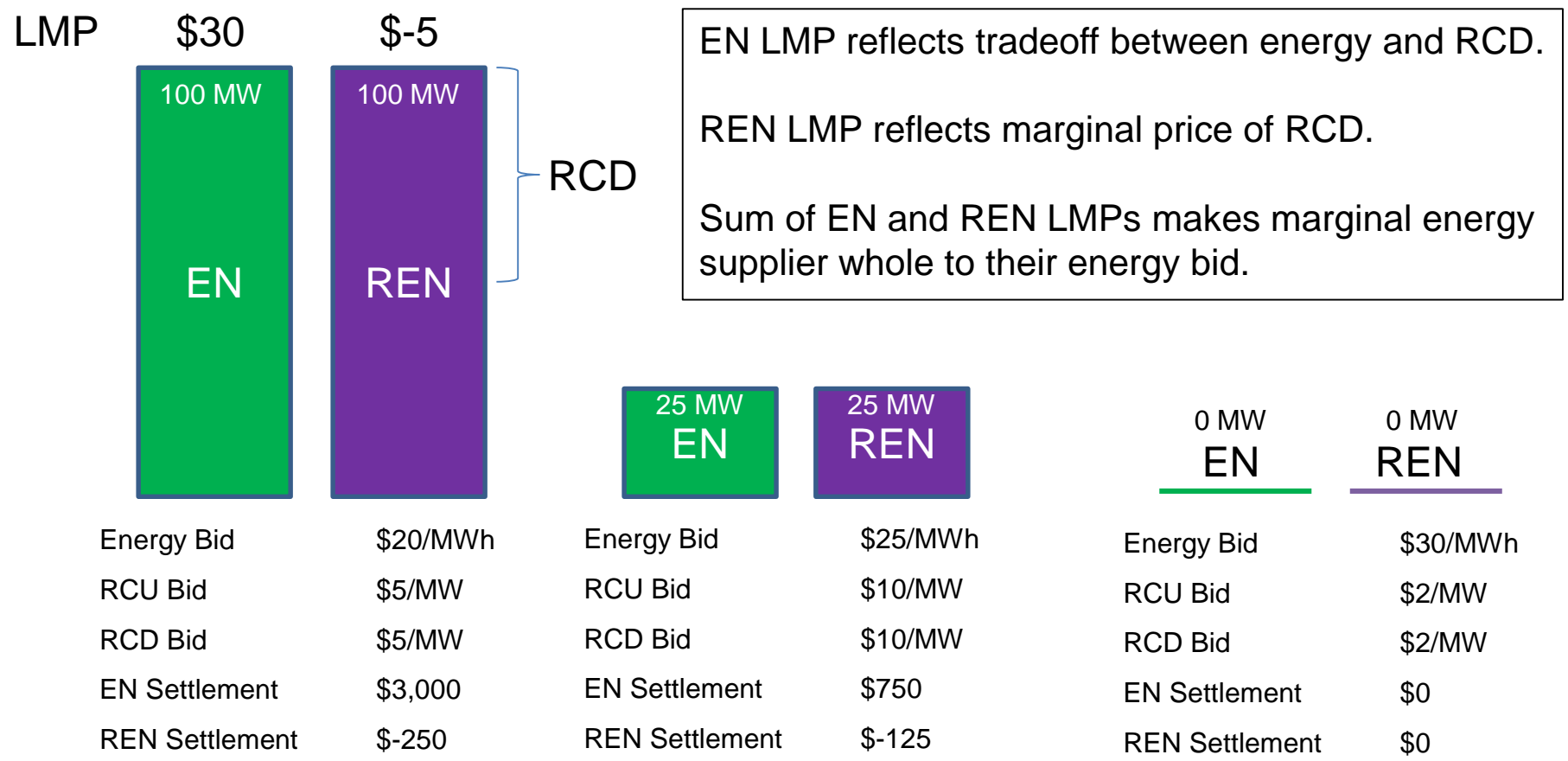
Load pays \$23/MWh and allocated \$2/MWh for energy schedule

Scenario 2: Load bids 125MW @ \$21, Forecast = 155MW



Load pays \$21/MWh and allocated \$2/MWh for energy schedule

Scenario 3: Load bids 125MW @ \$50, Forecast = 75MW

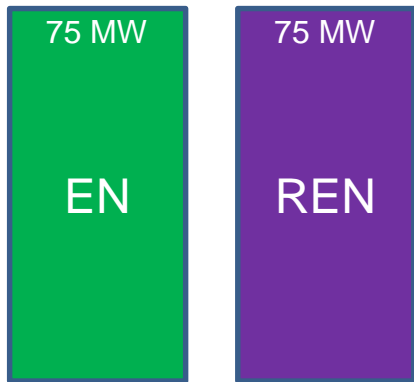


Load pays \$30/MWh and allocated -\$5/MWh for energy schedule

Scenario 4: Load bids 125MW @ \$21, Forecast = 75MW

LMP \$21 \$-1

EN LMP reflects marginal value of energy to load.
REN LMP reflects lost marginal value to load of REN power balance constraint.

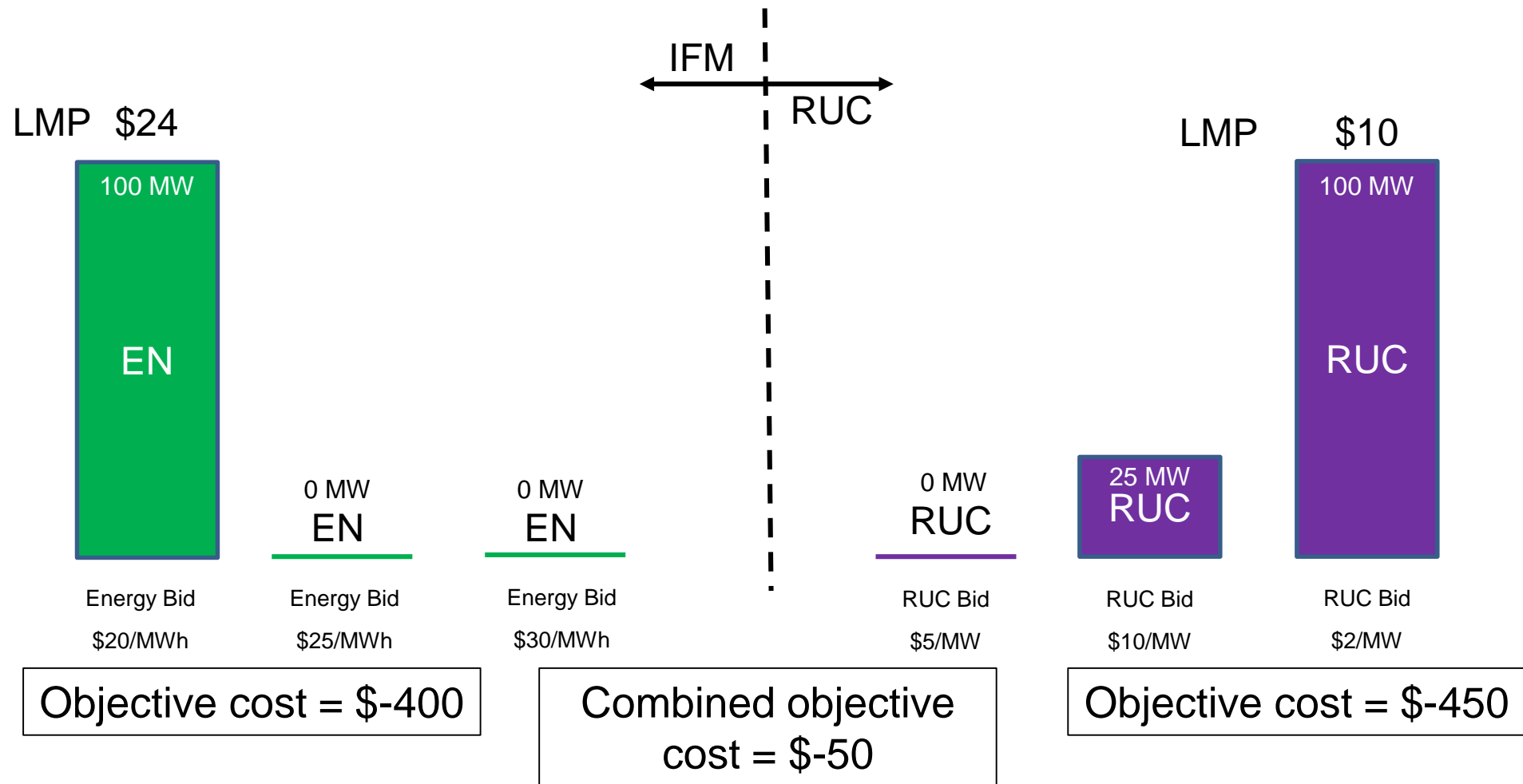


Energy Bid	\$20/MWh	Energy Bid	\$25/MWh	Energy Bid	\$30/MWh
RCU Bid	\$5/MW	RCU Bid	\$10/MW	RCU Bid	\$2/MW
RCD Bid	\$5/MW	RCD Bid	\$10/MW	RCD Bid	\$2/MW
EN Settlement	\$1,575	EN Settlement	\$0	EN Settlement	\$0
REN Settlement	\$-75	REN Settlement	\$0	REN Settlement	\$0

Load pays \$21/MWh and allocated \$-1/MWh for energy schedule

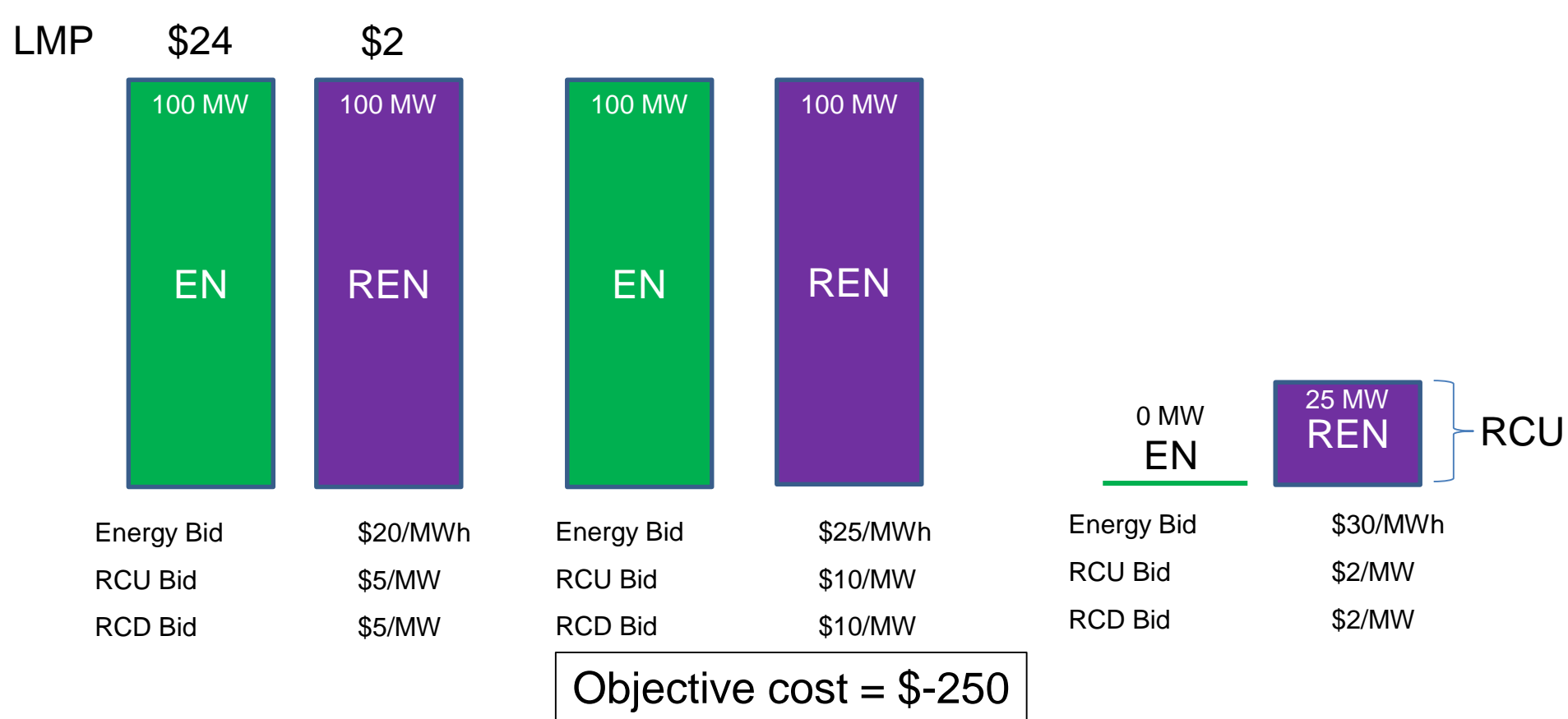
(1 of 2) Co-optimization of reliability capacity leads to more efficient scheduling with non-zero bids

Load bids 225MW @ \$24, Forecast = 225MW



(2 of 2) Co-optimization of reliability capacity leads to more efficient scheduling

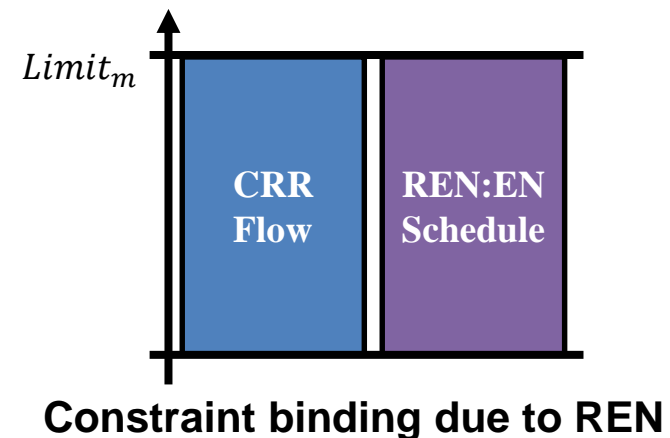
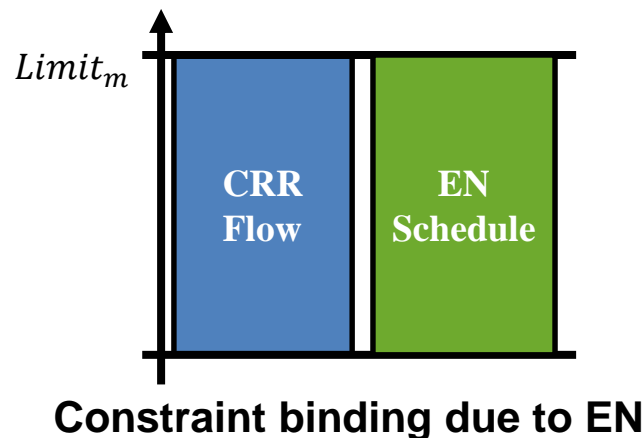
Load bids 225MW @ \$24, Forecast = 225MW



QUESTIONS?

Market participants can use a single CRR to hedge congestion resulting from EN and REN:EN schedules

- Constraints can be congested due to *energy* schedules, *reliability energy* schedules, or *imbalance reserve* awards
 - Today, a CRR from location A to location B is paid the congestion associated with *energy* schedules on constraints between location A and B
 - The CAISO proposes to also pay CRRs congestion associated with the energy portion of the reliability energy schedules between location A and B



CRR funding and settlement example for reliability energy schedules

Location	Awards (MWh)				Prices (\$/MWh)		
	REN Schedule	REN:EN	REN:RCU	REN:RCD	REN SYS	REN MCC	REN LMP
Gen A	100	150	-	50	\$20	(\$5)	\$15
Gen B	500	500	-	-	\$20	(\$10)	\$10
Gen C	400	250	150	-	\$20	(\$15)	\$5
Sub-Total	1,000	900	150	50			

Location	Revenue collection from buyers (\$)			Payments to sellers (\$)		
	REN:EN Cost	REN:RCU Cost	REN:RCD Cost	REN:EN	REN:RCU	REN:RCD
Gen A				\$2,250	\$0	(\$750)
Gen B	\$18,000	\$750	(\$750)	\$5,000	\$0	\$0
Gen C				\$1,250	\$750	\$0
Sub-Total	\$18,000	\$750	(\$750)	\$8,500	\$750	(\$750)
	Total revenue collected from buyers			Total payments to sellers		
			\$18,000			\$8,500

Congestion Revenue

\$9,500

Congestion Revenue Right	Quantity (MW)	Source MCC	Sink MCC	MCC Difference	CRR Payment
CRR A->Load	150	(\$5)	\$0	\$5	\$750
CRR B->Load	500	(\$10)	\$0	\$10	\$5,000
CRR C->Load	250	(\$15)	\$0	\$15	\$3,750
Sub-Total	900				\$9,500

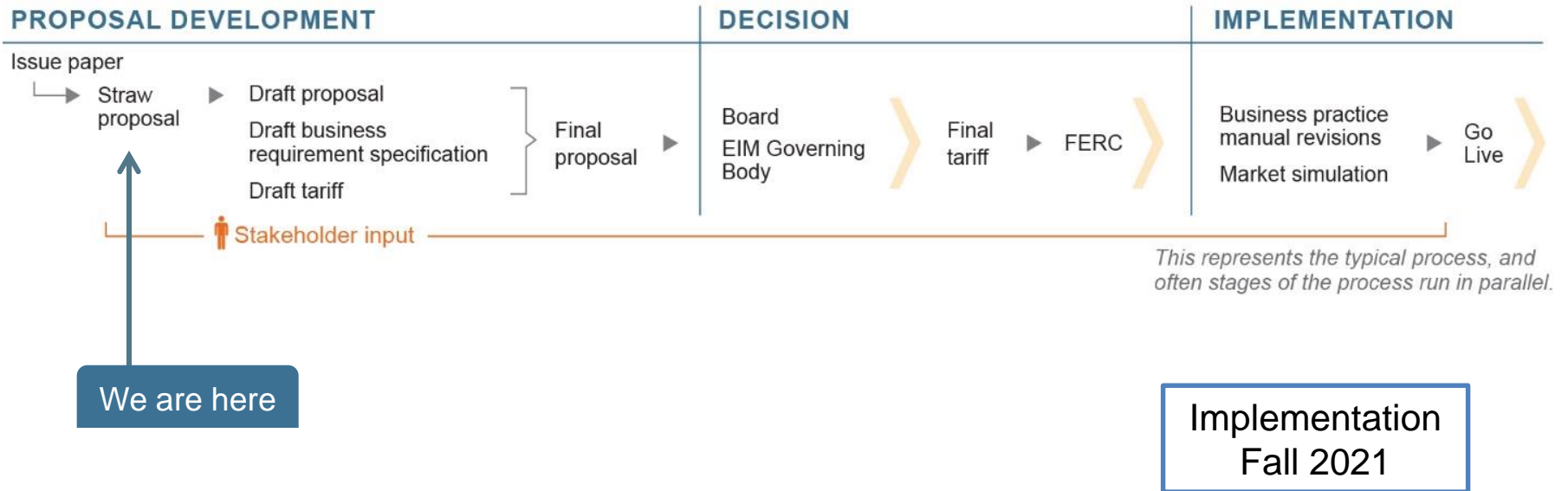
QUESTIONS?

CAISO proposes to extend local market power mitigation to reliability capacity and imbalance reserve bids

- Suppliers will offer to sell energy, reliability capacity, and imbalance reserves in the day-ahead market
- A supplier may be able to exercise market power in providing reliability capacity or imbalance reserve awards
- CAISO proposes to evaluate constraints for uncompetitive conditions and mitigate reliability capacity and imbalance reserve offers effective on binding constraints
 - Expand the DCPA to evaluate competitiveness of the new products
 - Need to develop default bids that represent the capacity availability costs (such as fuel arrangements)

QUESTIONS?

ISO Policy Initiative Stakeholder Process



DAME policy development schedule

Item	Date
Post Straw Proposal	February 3, 2020
Stakeholder Conference Call	February 10, 2020
Stakeholder Comments Due	March 2, 2020 Extended to March 26, 2020
Post Supplemental Presentation	March 2, 2020
Stakeholder Conference Call	March 5, 2020
Stakeholder Comments Due	March 26, 2020
Post Revised Straw Proposal	TBD
Stakeholder Conference Call	TBD
Stakeholder Comments Due	TBD

DAME implementation development schedule

- Straw Proposal – February 2020
- Straw Proposal Supplemental Material – March 2020
- Revised Straw Proposal – TBD
- Draft Final Proposal – TBD
- Tariff & BRS Development – Q3 & Q4 2020
- Policy Final Proposal – Q4 2020
- EIM GB and BOG decision – Q1 2021
- Implementation – Fall 2021

Next steps

- Stakeholders should comments on the DAME straw proposal by March 26, 2020
- Submit comments using the template provided on the CAISO's initiative webpage located here:
<http://www.caiso.com/StakeholderProcesses/Day-ahead-market-enhancements>
- Comments should be submitted to:
InitiativeComments@caiso.com